CALIFORNIA DIVISION OF MINES AND GEOLOGY

FAULT EVALUATION REPORT FER-137

November 19, 1982

1. Name of fault

Hunting Creek fault.

2. Location of fault

Chiles Valley, Walter Springs, Knoxville, Jericho Valley, and Wilson Valley 7.5-minute quadrangles, Napa, Lake, and Yolo Counties (figure 1).

3. Reason for evaluation

Part of 10-year fault evaluation program (Hart, 1980).

4. List of References

Bovis, M.J., 1982, Uphill-facing (antislope) scarps in the Coast Mountains, southwest British Columbia: Geological Society of America Bulletin, v. 93, p. 804-812.

Bryant, W.A., 1982, Green Valley fault zone, Cordelia and Mt. George quadrangles, California: California Division of Mines and Geology, unpublished Fault Evaluation Report FER-126.

Bufe, C.G., Marks, S.M., Lester, F.W., Ludwin, R.S., and Stickney, M.C., 1981, Seismicity of The Geysers-Clear Lake region, in Research in The Geysers-Clear Lake geothermal area, northern California: U.S. Geological Survey Professional Paper 1141, p. 129 to 137.

Cockerham, R.S. and Herd, D.G., 1982, Seismicity of the north end of the San Andreas fault system (abs): EOS, Transactions, American Geophysical Union, v. 63, no. 18, p. 384.

Fox, K.F., Jr., Sims, J.A., Bartow, J.A., and Helley, E.J., 1973, Preliminary geologic map of eastern Sonoma County and Western Napa County, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-483 (also Basic Data Contribution 56), scale 1:62,500.

Frizzell, V.A., Jr. and Brown, R.D., Jr., 1976, Map showing recently active breaks along the Green Valley fault, Napa and Solano Counties, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-743, scale 1:24,000.

Hart, E.W., 1980, Fault-rupture hazard zones in California: California Division of Mines and Geology Special Publication 42, 25 p.

Herd, D.G., 1981, Late Quaternary faults in the Jericho Valley, Knoxville, Walter Springs, and Wilson Valley 7.5-minute quadrangles, California: U.S. Geological Survey unpublished maps (tentatively scheduled for publication as a Miscellaneous Field Studies Map, scale 1:250,000).

Jennings, C.W., 1975, Fault map of California with locations of volcanoes, thermal springs, and thermal wells: California Division of Mines and Geology, Geologic Data Map Series Map No. 1, scale 1:750,000.

Lawton, J.E., 1956, Geology of the north half of the Morgan Valley quadrangle, and the south half of the Wilber Springs quadrangle: Unpublished Ph.D. thesis, Stanford University, 223 p., 2 pl. (scale 1:48,000).

Radbruch-Hall, D.H., 1978, Gravitational creep of rock masses on slopes, in Voight, B., (ed.), Rockslides and Avalanches, 1, Natural Phenomena: Developments in Geotechnical Engineering 14A, Elsevier Scientific Publishing Co., Amsterdam, Chapter 17, p. 607-657.

U.S. Department of Agriculture, 1958, Aerial photographs CSI 2V-90 to 94, black and white, vertical, scale approximately 1:20,000.

U.S. Department of Agriculture, 1959, Aerial photographs CSI 5V-131 to 139, black and white, vertical, scale approximately 1:20,000.

U.S. Geological Survey, 1957, Aerial photographs GS-VNS 2-77 to 82, black and white, vertical, scale approximately 1:38,000.

Wagner, D.L., 1974, Geologic map and sections of the Walter Springs area, Napa County, California: Unpublished M.S. thesis for California State University, San Jose, Plate 1, scale 1:12,000.

5. Review of available data

The Green Valley fault zone mapped by Frizzell and Brown (1976), which extends into Wooden Valley in the northern part of the Mt. George quadrangle, was thought to depict the northernmost trace of the Green Valley fault zone (Bryant, 1981). However, Herd (p.c., 1981) indicates that the Green Valley fault zone may extend much farther north than the fault zone mapped by Frizzell and Brown (figure 1, figures 2a-2b).

This hypothesized northern extension of the Green Valley fault zone is part of what may be a major zone of active strike-slip faults east of the

San Andreas fault zone. Two northwest-trending zones of seismicity east of the San Andreas fault zone recognized by Cockerham and Herd (1982) are associated with the Rodgers Creek-Maacama fault zone and the Green Valley-Bartlett Springs fault zone. They point out that the San Andreas fault zone in these latitudes is essentially aseismic.

Herd (1981) mapped a discontinuous zone of recently active, right-lateral strike-slip faults that generally corresponds to this zone of seismicity (figure 3). Herd (p.c., 1981) was unable to map a continuous fault zone, primarily because lengthy stretches along the trend of the fault are concealed by massive landslides. The association of the faults mapped in the Wilson Valley, Jericho Valley, Knoxville, and Walter Springs quadrangles with the Green Valley fault zone 30 km to the southeast is supported by the occurrence of microseismicity along the projected trend of the Green Valley fault, according to Herd (p.c., 1981). However, there is a gap of about 12 km in the zone of seismicity through most of the Walter Springs quadrangle, and the resumption of seismic activity is located as much as 5 km west of the fault zone mapped by Herd in the Jericho Valley quadrangle (figure 3).

Much work remains before it can be conclusively demonstrated that the Green Valley fault zone extends as far north as the Wilson Valley quadrangle. Therefore, for purposes of discussion in this FER, the fault zone mapped by Herd (1981) in the Wilson Valley, Jericho Valley, Knoxville, and Walter Springs quadrangles will be called the Hunting Creek fault zone, because the fault is best defined near and twice crosses Hunting Creek (figure 2a).

Fox, et al. (1973) mapped segments of the Hunting Creek fault zone in the Jericho Valley, Knoxville, and Walter Springs quadrangles (figures 2a-2b). They only map a short segment of the fault zone in the northern Jericho Valley quadrangle. Fox, et al. do not map a fault zone in the massive serpentinite

characteristic of the northern section of this Fault Evaluation Report. Pleistocene volcanic rocks are offset along the Hunting Creek fault at locality 1 (figure 2b), but Fox, et al. do not indicate that this fault segment is recently active. Fox, et al. map an approximately located fault in the Walter Springs quadrangle that generally coincides with the fault trace mapped by Herd (1981). However, Fox, et al. extend this fault farther south into the Chiles Valley quadrangle (figure 1).

Wagner (1974) mapped a portion of the Walter Springs quadrangle (figure 2b). A fault mapped by Wagner in the central and southern part of the Walter Springs quadrangle, the Pope Creek fault, generally coincides with the fault trace of Herd (1981), although some differences in detail exist (figure 2b). Wagner states that the Pope Creek fault is Quaternary-active, based on an inferred offset of Pleistocene-age basalt overlying the Plio-Pleistocene Cache Formation. Wagner also states that the fault is characterized by well-defined air photo lineations.

South of his study area, Wagner (1974) indicates that a fault zone he terms the Cedar Roughs fault may be Holocene-active, based on geomorphic features in landslide deposits along the west side of Cedar Roughs (figure 1). Fox, et al. (1973) map these features as a fault, but they do not indicate recent activity. Herd (1981) did not observe geomorphic evidence of recent faulting. He states that massive landslides in the Cedar Roughs area conceal evidence of recent faulting (Herd, p.c., 1981).

6. Air photo interpretation

Air photo interpretation of segments of the Hunting Creek fault zone by this writer are summarized on figures 2a-2b. Air photo coverage of the Wilson Valley quadrangle was not available. The Hunting Creek fault in the Jericho

Valley and Knoxville quadrangles is generally well-defined and is characterized by geomorphic features indicating right-lateral strike-slip faulting (figure 2a). A systematic right-lateral deflection of streams and ridges, linear troughs, sidehill benches, and scarps suggest Holocene activity. Ephemeral geomorphic features generally were not observed along the Hunting Creek fault south of the Knoxville quadrangle (figure 2b).

Recent geomorphic features along the west side of the Cedar Roughs area, thought to be Holocene-active by Wagner (1974) and mapped as faults by Fox, et al. (1973), may, in fact, be "lateral spread" features (Bovis, 1982; Radbruch-Hall, 1978) (figure 1). Classic uphill-facing scarps and sidehill troughs are located near the ridge-tops and the heads of very massive landslides.

7. Field investigation

A very brief, one-day field check of the Hunting Creek fault zone was conducted in the northern Jericho Valley quadrangle (figure 2a). The fault zone in this location occurs within sheared serpentinite. Geomorphic features, such as a linear trough, scarps, and vegetation contrasts, clearly delineate the fault zone. Outcrops are rare and vegetation cover is locally very dense. Two roadcuts that cross the fault zone were examined for evidence of recent faulting. Pervasively sheared serpentinite characterized both roadcuts. A predominately vertical "shear fabric" was observed where geomorphic features indicated the Hunting Creek fault should be. However, shears are abundant throughout the serpentinite, and it is extremely difficult to evaluate recency of movement. At locality 2 (figure 2a), thick colluvium (no shears observed in colluvium) and a more intensely sheared, expansive

serpentine in a roadcut align with geomorphic features indicating a recently active fault.

8. Conclusions

The Hunting Creek fault zone mapped by Herd (1981) may represent a partly unrecognized major fault zone incorporating the Green Valley fault zone north of Suisun Bay and the Concord fault south of Suisun Bay (Cockerham and Herd, 1982; Herd, p.c., 1981). Herd (p.c., 1981) indicates that the Hunting Creek fault zone is probably Holocene-active, based on geomorphic features characterizing the fault zone, such as right-laterally deflected drainages and ridges, sidehil benches, troughs, and shutter ridges, and the association of seismicity along the trend of the fault zone.

Air photo interpretation by this writer generally confirms the mapping of Herd (1981). Faults in the Jericho Valley and Knoxville quadrangles are well-defined and are characterized by geomorphic features indicating Holocene activity (figure 2a). South of the Knoxville quadrangle, faults mapped by Herd are somewhat less well-defined and may not have had displacement during Holocene time.

9. Recommendations

Recommendations for zoning faults for special studies are based on the criteria of sufficiently active and well-defined (Hart, 1980).

Zone for special studies well-defined traces of the Hunting Creek fault zone in the Jericho Valley and Knoxville quadrangles indicated on figure 4, based on mapping by Herd (1981).

10. Report prepared by William A. Bryant, November 19, 1982.

William A. Bryant

I agree with the recommendations.
E.H.H. 11/24/82

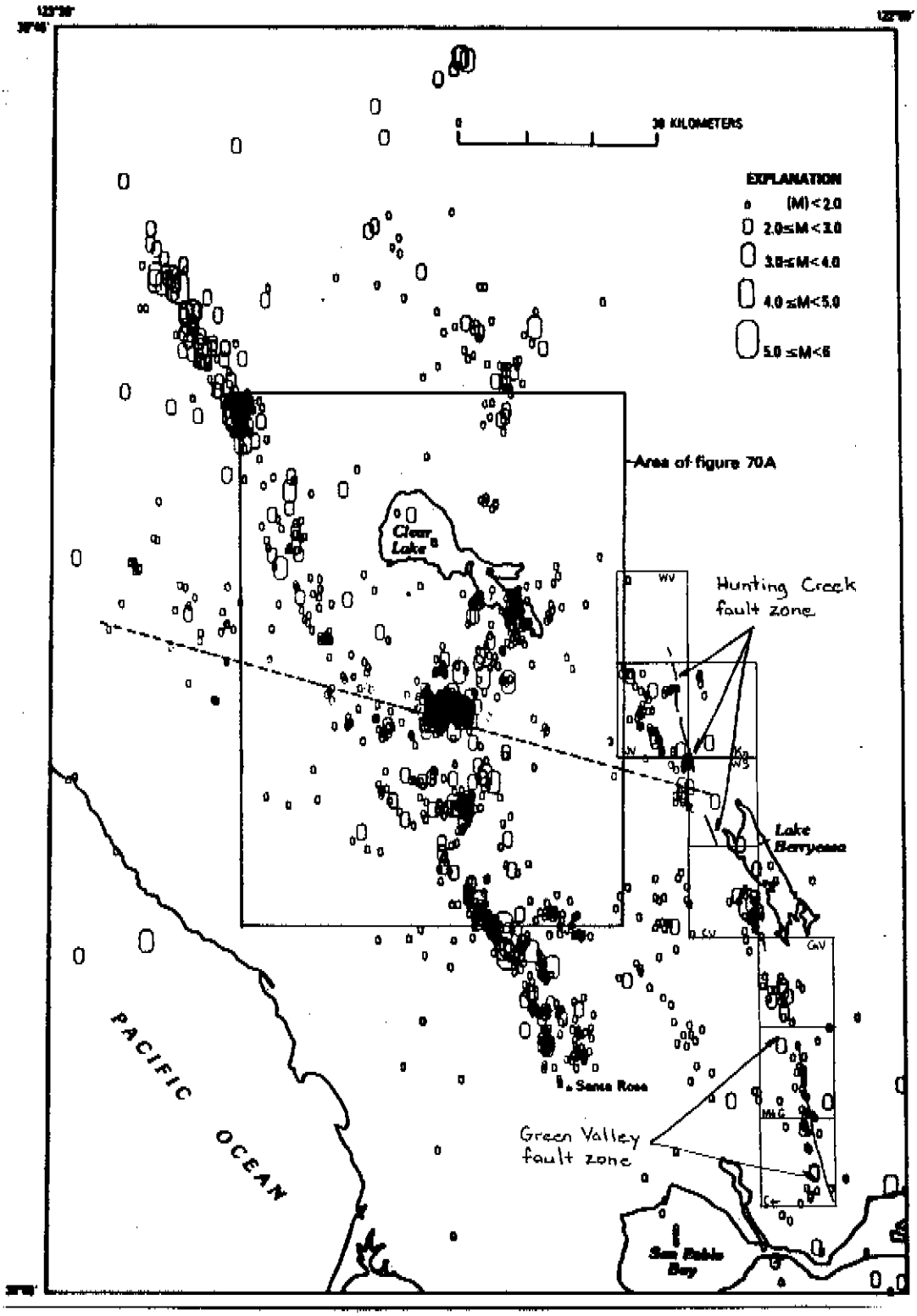

Figure 3 (to FER-137). Regional seismicity map (preliminary) for the period 1969 to 1978. Traces of the Green Valley and Hunting Creek fault zones of Herd (1981) are also shown. Symbols for quadrangle locations along these fault zones are as follows: WV=Wilson Valley, JV=Jericho Valley, Kn=Knoxville WS=Walter Springs, CV=Chiles Valley, CaV=Capell Valley, MtG=Mt. George, Cor=Cordelia. (Seismicity from Bufe, et al., 1981).